Creating Naturally Enhanced Concrete for Seismic Resistance

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This research report is an investigation into which natural materials in combination with concrete will strengthen a structure's stability against lateral movement. The main purpose of this experiment is to determine the material that will best reinforce concrete while also being cost-effective and sustainable in a 3rd world country like Haiti. Bamboo fibers and hemp were chosen to be mixed in with concrete to determine which combination of materials results in the best seismic resistance. Using different weights and a steel rod, the flexibility of all the materials were found. Each of the materials was mixed with concrete in equal proportions to ensure the accuracy of the results. Once ready to be tested, the blocks were placed on a steel rod and weights were placed on each side until the concrete cracked or broke. The bamboo fibers, taken from a reed fence in combination with concrete, were the most flexible and stable against the weights because of how well the bamboo bound with the concrete. In addition, the second bamboo fiber concrete was the least brittle of the bricks which was a contributing factor. The second bamboo brick was able to hold over 100lbs of weight per side. On the other hand, the first plain concrete brick held the same weight. At first glance, the first concrete brick seemed surprisingly flexible. However, the brick is also very dense and the thickest in-depth of all the bricks. Additionally, this brick was also made first and had a longer to harden, which naturally made the brick much stronger. Overall, it was found that thickness plays a role in the flexibility of a brick, and the size of the fibers mixed in with concrete can either cause a structure to strengthen or collapse.

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